5 April 2012 - Met Office research suggests industrial air pollution is largely responsible for changes in the temperature of the Atlantic Ocean which are linked to drought, flooding and hurricane activity.

Published in the journal Nature , the study is the first to clearly link aerosol 'dirty pollution' and, to a lesser extent, volcanic eruptions to observed 20th century temperature variations in the Atlantic Ocean.

These shifts in ocean temperature, known as the Atlantic Multidecadal Oscillation or AMO, are believed to affect rainfall patterns in Africa, South America and India, as well as hurricane activity in the North Atlantic - in extreme cases leading to humanitarian disasters.

Ben Booth, a Met Office climate processes scientist and lead author of the research, said: "Until now, no-one has been able to demonstrate a physical link to what is causing these observed Atlantic Ocean fluctuations, so it was assumed they must be caused by natural variability.

"Our research implies that far from being natural, these changes could have been largely driven by dirty pollution and volcanoes. If so, this means a number of natural disasters linked to these ocean fluctuations, such as persistent African drought during the 1970's and 80's, may not be so natural after all."

The Atlantic variations in question see warm and cold fluctuations in temperature over several decades. A warm period increases hurricane activity in the North Atlantic and rainfall in parts of Africa, while reducing rainfall in South America. A cold period has the opposite impacts.

A state-of-the-art Met Office climate model, which simulates the physical processes of the Earth's atmosphere, has reproduced the variations for the first time. It shows a clear link between Atlantic variations and the peaks and troughs in industrial pollution from countries around the Atlantic. Volcanoes also play a smaller role.

"Particles from industrial pollution make clouds brighter and last longer, which means they can reflect much more of the Sun's energy into space," said Paul Halloran, a Met Office ocean scientist.

"When we include these processes in our latest climate model the observed changes emerge. When industrial pollution peaked over the Atlantic, this effect played a big role in cooling the ocean beneath; as pollution was cleaned up - for example after the clean air legislation of the 90's - the seas warmed."

The research suggests human activity can, and already has, driven large-scale regional climate changes and, in this case at least, that natural variability doesn't have a big role to play.

Nick Dunstone, a decadal climate prediction expert at the Met Office, said: "Our research could have important implications for understanding human influence in large-scale climate impacts, as well as predicting and potentially avoiding future changes in the Atlantic region.

"However, it's important to note that these findings are based on only one model, so further research using other next-generation climate models is required to shed further light on the mechanisms at play."

Contact information

Met Office Press Office: **+44 (0)1392 886655**

E-mail: Press Office

Met Office Customer Centre: **01392 885680**

If you're outside the UK: **+44 1392 885680**

Last updated: 10 April 2012